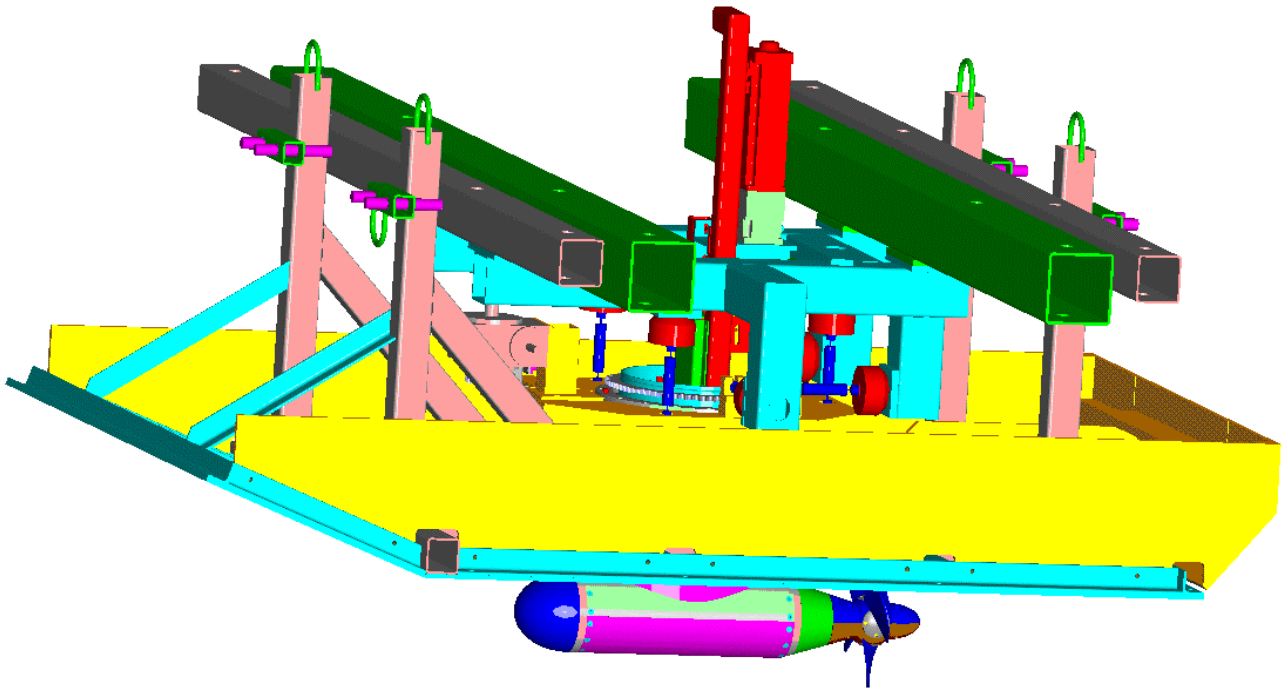
Measuring Podded Propeller Performance in Ice

National Research Council
Institute for Ocean Technology
St. John's, Newfoundland Canada

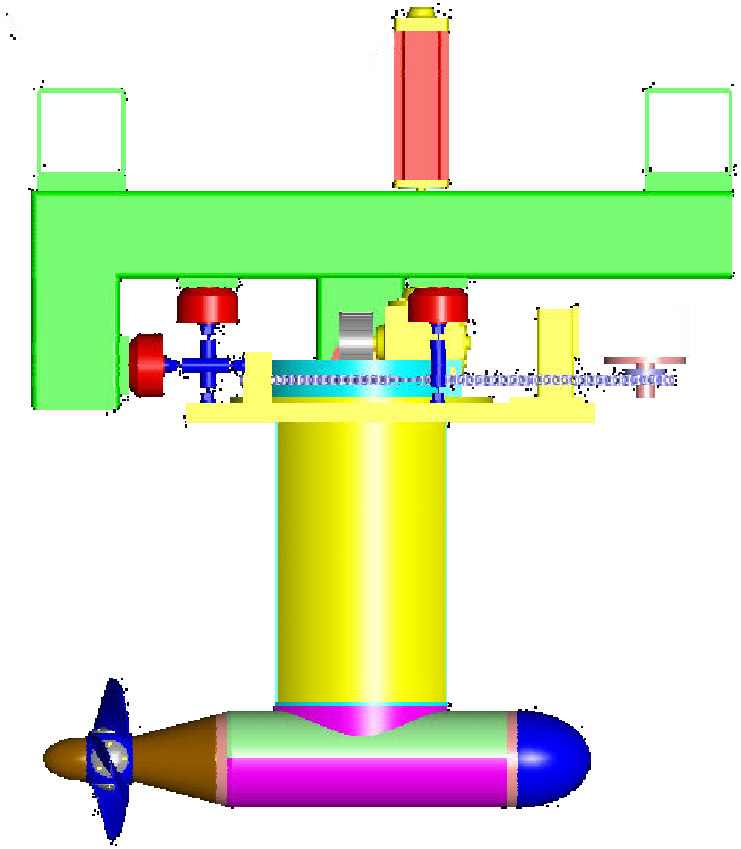
Model Assembly



Measuring Podded Propeller Performance in Ice

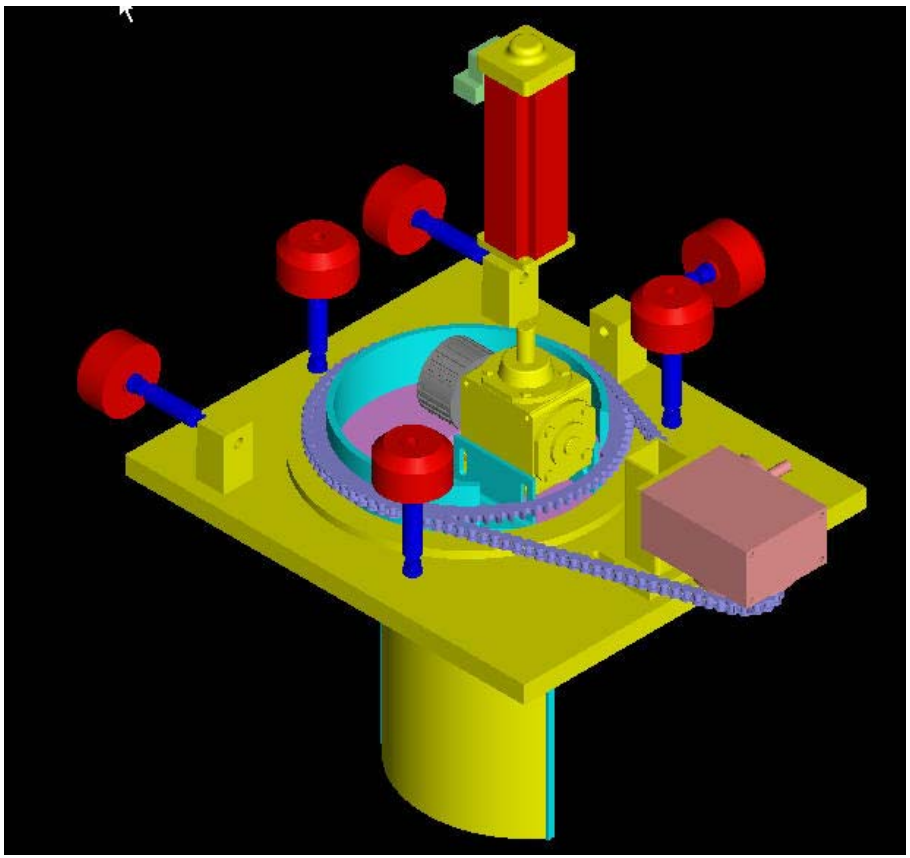
Sensors

- The global dynamometer
- Bearing Loads
- Shaft torque
- Loads on a blade
- Blade angular position

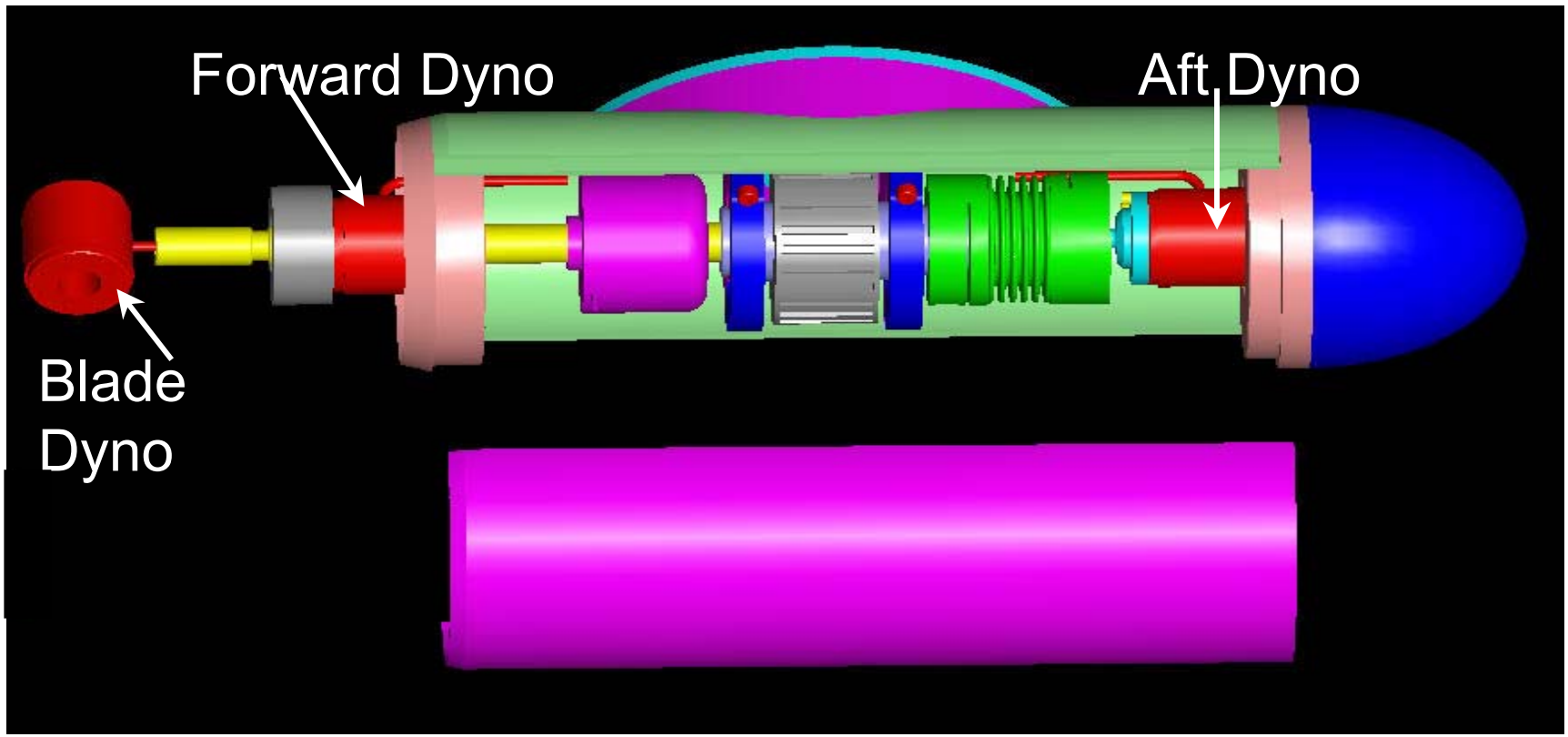


NRC · CNRC

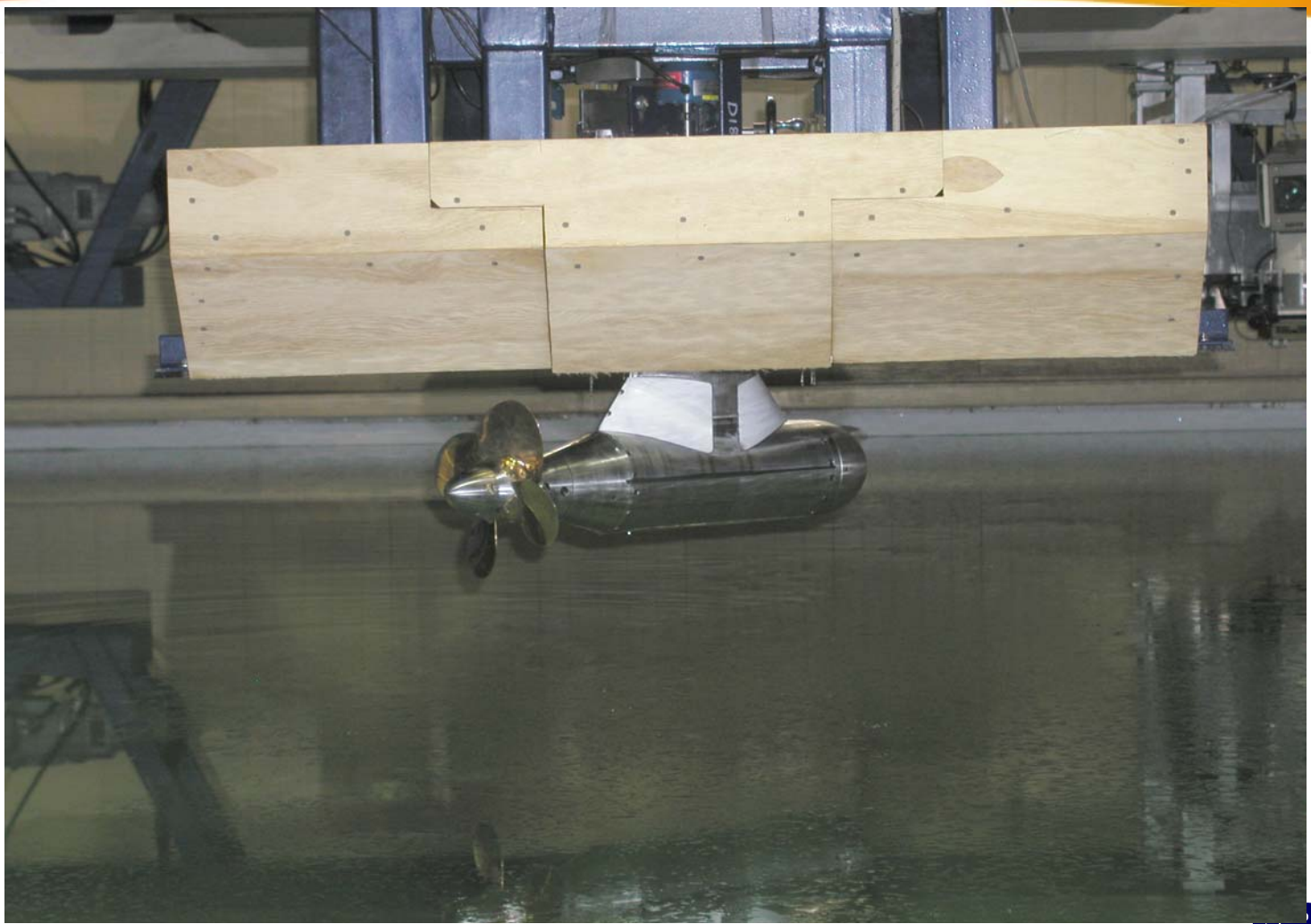
Global Dynamometer



Pod Interior



Measuring Podded Propeller Performance in Ice



NRC · CNRC

Measuring Podded Propeller Performance in Ice

IOT Ice Tank

Tank:

Useable area is 76m x 12m x 3m

Speeds: 0 to 4 m/s

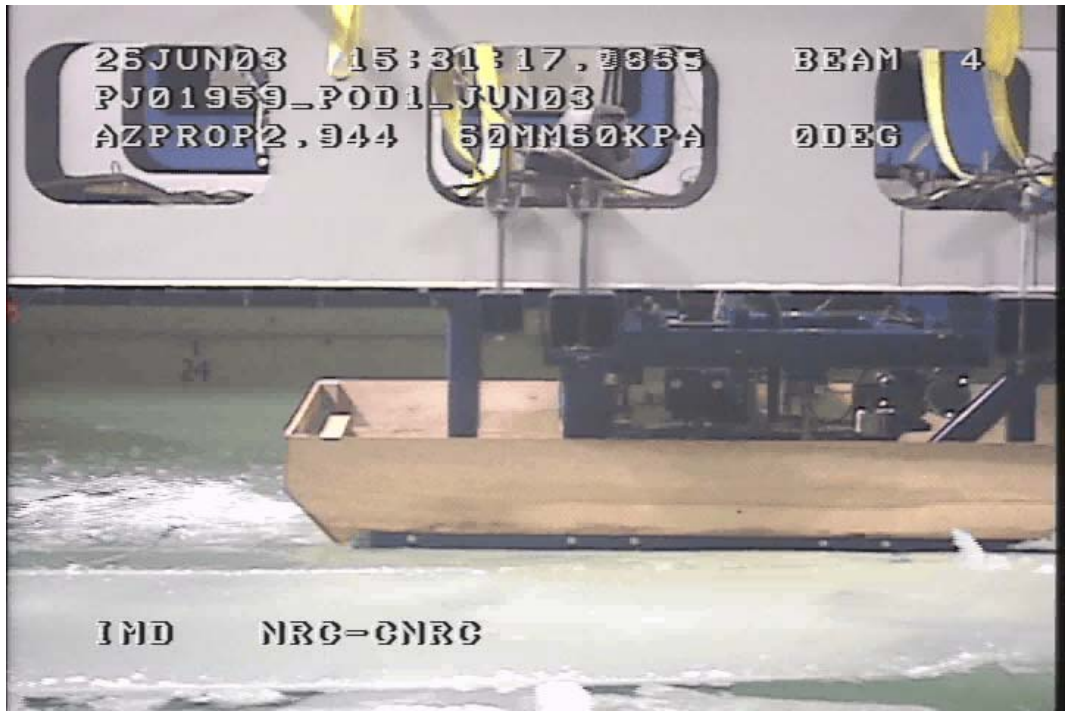
Ice: Model EG/AD/S (water, Ethylene Glycol,

Aliphatic Detergent and Sugar (0.39/0.036/0.04%))

NRC · CNRC

Measuring Podded Propeller Performance in Ice

Experiment



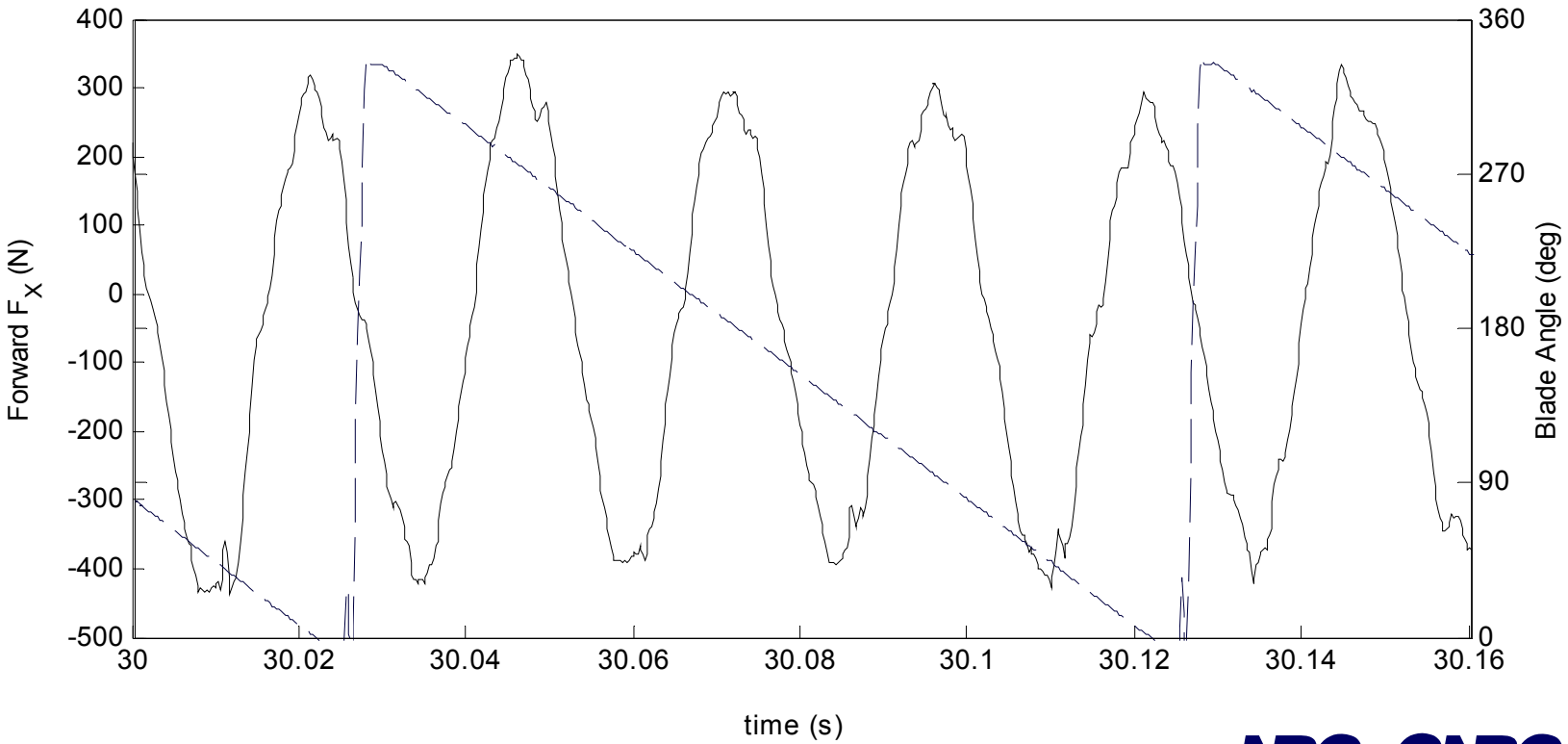
1 & 2 View from side showing false stern

3 View from below showing propeller breaking ice

4 Propeller hits the ice

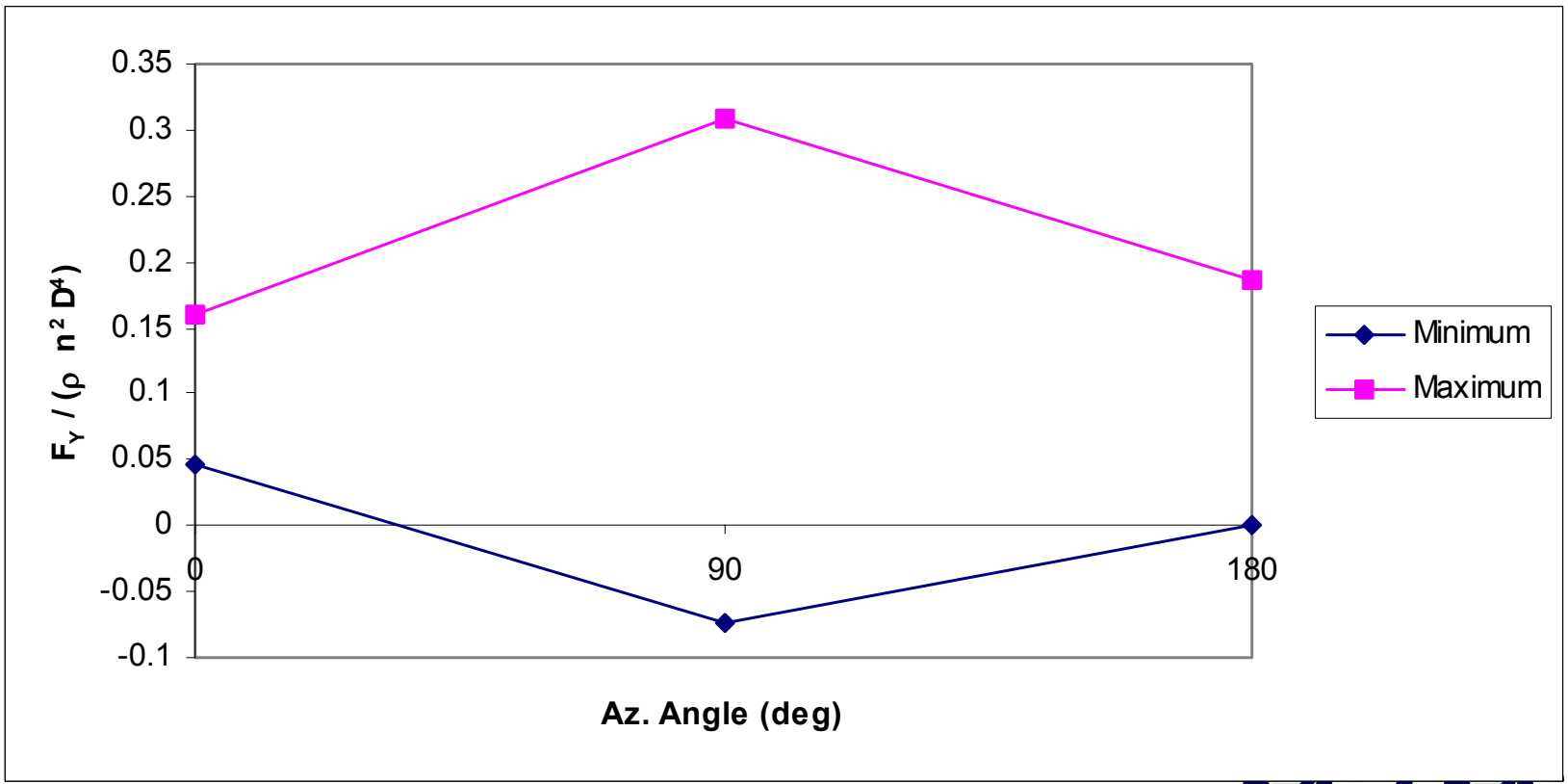
NRC · CNRC

Blade Angular Position vs. Bearing Loads



NRC · CNRC

Global Fy


0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
$F_Y / (\rho\ n^2 D^4)$
0
90
180
Az. Angle (deg)
Minimum
Maximum

Thank you all !